

We Claim:

1. A method for forming a polymer comprising initiating a polymerization of tertiary alkene monomers and vinyl aromatic hydrocarbon monomers, said vinyl aromatic hydrocarbon monomers having substituents of the formula  $\underline{R^1SiR^2R^3R^4}$ , wherein  $R^1$  is optional and is a hydrocarbon or ether linking the silicon and said vinyl aromatic, and  $R^2$ ,  $R^3$ , and  $R^4$  are one or more of hydrogen, alkyl, and alkoxy, with the proviso that no more than two may be hydrogen or alkyl.
2. The method of claim 1 wherein said polymerization is initiated by a cationic initiator system.
3. The method of claim 1 wherein said tertiary alkene is one or more of isobutylene, 2-methylbutene, 2-methylpentene, and 2-methylhexene.
4. The method of claim 1 wherein said  $R^1$  is present and comprises a  $C_1-C_8$  alkyl group and may optionally include one or more of an ether group.
5. The method of claim 1 wherein said  $R^2$ ,  $R^3$ , and  $R^4$  are independently selected from one or more of hydrogen,  $C_1-C_{10}$  alkyl groups, methoxy, ethoxy, propoxy, butoxy, pentoxy, and alkoxy groups with up to 10 carbons in the alkyl portion, with the proviso that no more than two be hydrogen or alkyl.
6. The method of claim 2 wherein said cationic initiator system comprises a Lewis acid and alkyl halide.

7. The method of claim 6 wherein said Lewis acid is selected from  $TiCl_4$ ,  $BCl_3$ ,  $AlCl_3$ ,  $Et_2AlCl$ ,  $EtAlCl_2$ , and mixtures thereof.
8. The method of claim 6 wherein said alkyl halide comprises one or more of  $\alpha$ ,  $\alpha'$ ,  $\alpha'$  tetramethyl-1,4-benzenedimethyl chloride, *t*-butyl chloride, *t*-butyl bromide, 2-chloro-2-methylpentane, 2-bromo-2-methylpentane, 2-chloro-2-methylbutane, 2-chloro-2-phenylpropane, 2-bromo-2-phenylpropane, 1,3-(2-chloro-2-propyl)-5-*t*-butyl benzene, 1,3-(2-bromo-2-propyl)-5-*t*-butyl benzene and 2-bromo-2-methylbutane.
9. A method for forming a building sealant comprising:  
initiating cationic polymerization of tertiary alkene monomer units and vinyl aromatic hydrocarbon monomer units, said vinyl aromatic hydrocarbon monomer units having substituents of the formula  $R^1SiR^2R^3R^4$ , wherein  $R^1$  is optional and is a hydrocarbon or ether linking the silicon and said vinyl aromatic, and  $R^2$ ,  $R^3$ , and  $R^4$  are one or more of hydrogen, alkyl, and alkoxy, with the proviso that no more than two may be hydrogen or alkyl, to form a sealant polymer, and combining said sealant polymer with a hardener.
10. The method of claim 9 wherein said polymerization is cationic and includes a Lewis acid.
11. The method of claim 10 wherein said Lewis acid comprises  $TiCl_4$ ,  $BCl_3$ ,  $AlCl_3$ ,  $Et_2AlCl$ ,  $EtAlCl_2$ , and mixtures thereof.

12. The method of claim 9 wherein said  $R^1$  is present and comprises a  $C_1$ - $C_8$  alkyl group and may optionally include one or more ether groups.

13. The method of claim 9 wherein said  $R^2$ ,  $R^3$ , and  $R^4$  are independently selected from one or more of hydrogen,  $C_1$ - $C_{10}$  alkyl groups, methoxy, ethoxy, propoxy, butoxy, pentoxy, and alkoxy groups with up to 10 carbons in the alkyl portion, with the proviso that no more than two be hydrogen or alkyl.

14. The method of claim 9 wherein said hardener comprises a tin or amine containing compound.

15. A sealant polymer composition formed by:  
initiating a cationic polymerization of tertiary alkene monomer units and vinyl aromatic hydrocarbon monomer units, said vinyl aromatic hydrocarbon monomer units having substituents of the general formula  $R^1SiR^2R^3R^4$ , wherein  $R^1$  is optional and is a hydrocarbon or ether linking the silicon and said vinyl aromatic, and  $R^2$ ,  $R^3$ , and  $R^4$  are one or more of hydrogen, alkyl, and alkoxy, with the proviso that no more than two may be hydrogen or alkyl.

16. The polymer of claim 15 wherein said cationic polymerization includes a Lewis acid catalyst.

17. The polymer of claim 16 wherein said Lewis acid comprises  $TiCl_4$ ,  $BCl_3$ ,  $AlCl_3$ ,  $Et_2AlCl$ ,  $EtAlCl_2$ , and mixtures thereof.

18. The polymer of claim 15 wherein said polymer is telechelic.
19. The polymer of claim 15 wherein said substituent is in a para position of said vinyl aromatic hydrocarbon.

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